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FOLEY AND LARDNER
SUITE 500
3000 K STREET NW
WASHINGTON, DC 20007

EXAMINER

THOMSON, WILLIAM D

| ART UNIT | PAPER NUMBER |
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2123

DATE MAILED: 07/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/061,455

Applicant(s)

AYACHE ET AL.

Examiner

William D. Thomson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 February 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2/04/02.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-14 have been submitted for examination, including preliminary amendments which have been entered.
2. Claims 1-14 have been examined and rejected.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file. Applicants' priority date is established as February 8, 2001.

Information Disclosure Statement

4. The information disclosure statement (IDS) submitted on February 4, 2002 was considered by the examiner. However it is noted that a number of prior art teachings have been uncovered during the prior art search for the claimed invention in which at least one of the named inventors was a co-author. Applicants are respectfully reminded of their duty to disclose prior art under Rules 56, 97 and 98.

Drawings

5. Figures 1-3D should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s)

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should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

6. The drawings are objected to because Figures 1, and 4A-6 are not enumerated in accordance with standard practices. In figure 4A the Virtual vertex is denoted Si however none of the preceding figures 4B, 5A, 5B or 6 have been denoted with equivalent notations for the same or similar items. Items referenced in the specification and figures should include notations that provide corresponding numbering to clearly express the Applicants' invention. See Rules 83 and 84.

7. Figure 7 is objected to based upon the fact that there is a typographic error in decision block 42, denoted as "3?1/". Looking to the specification on pages 18 and 19 which describe this figure 7, there is no direction to clarify the issue. Correction is required, however, no new matter may be entered. Examiner has interpreted this as a typographic error, please provide an amendment that clarifies this issue. Further, each sheet of drawings has been provided with references to the sheet number, i.e. 1/3 etc. These need to be removed when new drawings (sheet(s)) are provided with the corrections.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate

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prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

8. The abstract of the disclosure is objected to because on the same sheet of paper is a reference to Figure 1. The abstract must be on a separate paper without reference to the figure(s) as it has been presented. Correction is required. See MPEP § 608.01(b).

9. The specification is objected to based upon the lack of headers delineating the separate sections of the specification.

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use:

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC (See 37 CFR 1.52(e)(5) and MPEP 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text are permitted to be submitted on compact discs.) or
REFERENCE TO A "MICROFICHE APPENDIX" (See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.)
- (f) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.
 - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

10. The disclosure is objected to because of the following informalities:

35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms which are not

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clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms used in the specification are: "memory zone", "adapted to", "characterized in that", for example.

Examiner suggests submission of a substitute specification in proper idiomatic English and in compliance with 37 CFR 1.52(a) and (b) is required. The substitute specification filed must be accompanied by a statement that it contains no new matter.

Appropriate correction is required.

Claim Objections

11. Claims 1-14 are objected to because of the following informalities: use of "memory zone", "adapted to" and "characterized in that" are interpreted as translational issues. Also see MPEP 2106 for language that suggests or makes optional but does not require steps to be performed or *does not limit a claim to a particular structure does not limit the scope of a claim or claim limitation. Markman v. Westview Instruments*, 52 F.3d 967, 980, 34 USPQ2d 1321, 1330 (Fed. Cir.) (en banc), aff 'd, U.S. , 116 S. Ct. 1384 (1996). Looking to specification the phrase "adapted to" with respect to the modules and computer and memory structure is not clear. Correction of the language within the specification and alignment of the language in the claims should clear up this issue.

12. For examination purposes the phrase "memory zone adapted to" is interpreted as 'an area of memory storing' and "characterized in that" has been interpreted as

'comprising' or "further comprising" since as used in the claims this language is not clear. See MPEP 2111.03, *where the transitional term "comprising", which is synonymous with "including," "containing," or "characterized by," is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. See, e.g., Invitrogen Corp. v. Biocrest Mfg., L.P., 327 F.3d 1364, 1368, 66 USPQ2d 1631, 1634 (Fed. Cir. 2003) ("The transition comprising' in a method claim indicates that the claim is open-ended and allows for additional steps."); Genentech, Inc. v. Chiron Corp., 112 F.3d 495, 501, 42 USPQ2d 1608, 1613 (Fed. Cir. 1997).* Appropriate correction is required to clarify the claims.

13. Claims 1-14 are objected to base upon the use of "-" and bullets to denote new stanzas, these need to be removed. Appropriate correction is required to clarify the claims.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

14. The claims, 1-14, are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors. The phrase "adapted to" is language that suggests or makes optional but does not require steps to be performed or *does not limit a claim to a particular structure does not limit the scope of a claim or claim limitation. Markman v. Westview Instruments, 52 F.3d 967, 980, 34*

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USPQ2d 1321, 1330 (Fed. Cir.) (en banc), aff'd, U.S. , 116 S. Ct. 1384 (1996).

Looking to specification the phrase "adapted to" with respect to the modules and computer and memory structure is not clear, and therefore does not further limit the claims.

15. The use of the phrase "characterized in that the computer comprises", in claim 1 for example, renders the claims indefinite since the equivalent phrase would be "comprising the computer comprises" or "comprising in that the computer comprises". The transitional term "comprising", which is synonymous with "including," "containing," or "characterized by," is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. See, e.g., *Invitrogen Corp. v. Biocrest Mfg., L.P.*, 327 F.3d 1364, 1368, 66 USPQ2d 1631, 1634 (Fed. Cir. 2003) ("*The transition comprising' in a method claim indicates that the claim is open-ended and allows for additional steps.*"); *Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501, 42 USPQ2d 1608, 1613 (Fed. Cir. 1997). Dependent claims, 2-14, inherit this defect. This appears to be an idiomatic error as well.

16. Claims 1-14, taking claim one, for example uses "mechanical parameters of the material of the object (λ , μ)". Where, λ and μ which are not defined in the claims, these should be denoted as Lamé coefficients to clarify the claims. In claim 5 these are denoted as a mesh with subscripts of n , representing at least partially defined locally, particularly at the level of the mesh or elements thereof, which further renders the claims 5-7 indefinite. Claim 6 includes the phrase "with a view to estimating a derivative of the potential deformation energy...", where the phrase "with a view to" renders claims

6 and 7 indefinite. Claim 8, recites the phrase 'so-called "virtual" vertices (Si)', where the phrase "so-called" renders the claim indefinite. Looking to the specification there is further clarification of this phrase "so-called". Again these claims appear to be a literal translation from the French, and in so appear to have many idiomatic English errors or translational discrepancies.

17. Moreover, claim one includes other notations that are well defined in the claims, such as " μp " and "MT" make up a computer that is inclusive of memory but also "cooperates" with "memory zone" (interpreted for examining as an area of memory (MEM) to evaluate, yet the evaluation steps are not clear in the manner in which these components "cooperate" with one another to perform the functions that are recited thereafter. Similar defects are in dependent claims that recite phrases like "so that the computer is able to" perform an operation that comes thereafter. It is unclear as to how this the computer is being made operable or functions to perform the operations. Again these claims appear to be a literal translation from the French, and in so appear to have many idiomatic English errors or translational discrepancies.

18. Claims 1-14 as drafted currently include at least an apparatus and a method, a single claim which claims both an apparatus and the method steps of using the apparatus is indefinite under 35 U.S.C. 112, second paragraph. In *Ex parte Lyell*, 17 USPQ2d 1548 (Bd. Pat. App. & Inter. 1990), a claim directed to an automatic transmission workstand and the method steps of using it was held to be ambiguous and properly rejected under 35 U.S.C. 112, second paragraph.

Claim Rejections - 35 U.S.C. § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, *or* composition of matter, *or* any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

19. Claims 1-14 are rejected under 35 U.S.C. § 101 since they are directed to both an apparatus and method, such claims are rejected under 35 U.S.C. 101 based on the theory that the claim is directed to neither a "process" nor a "machine," but rather embraces or overlaps two different statutory classes of invention set forth in 35 U.S.C. 101 which is drafted so as to set forth the statutory classes of invention in the alternative only.

Claim Rejections - 35 U.S.C. § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

20. Claims 1-5, and 8-14 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by FR 2,771,202 (see WO99/26119 for equivalent English translation, hereinafter referred to as Cotin et al.

In the instant case the claims have been afforded an interpretation since a claim limitation which is considered indefinite cannot be disregarded. If a claim is subject to more than one interpretation, at least one of which would render the claim unpatentable over the prior art, the examiner should reject the claim as indefinite under 35 U.S.C. 112, second paragraph (see MPEP § 706.03(d)) *and should reject the claim over the prior art based on the interpretation of the claim that renders the prior art applicable*. Ex parte Ionescu, 222 USPQ 537 (Bd. Pat. App. & Inter. 1984) (Claims on appeal were rejected on indefiniteness grounds only; the rejection was reversed and the case remanded to the examiner for consideration of pertinent prior art.). Compare In re Wilson, 424 F.2d 1382, 165 USPQ 494 (CCPA 1970) (if no reasonably definite meaning can be ascribed to certain claim language, the claim is indefinite, not obvious)

Claims 1-5, and 8-14 have been interpreted as computer having memory and data that simulates the mechanical parameters of the material of an object having vertices and using meshes and force data to evaluate positions of the vertices as a function of stress exerted and repeatedly determining deviations between current length of an edge of the mesh and its previous length or its length at rest and store the respective force data for each vertex of the mesh and determining for each vertex new data as to the position of the vertex as a function of the combined forces exerted on each vertex based upon the previous position of the vertex and mechanical parameters of the material using Lamé coefficients. The object is a three dimensional shape, having a grid pattern of a tetrahedral, where temporary or virtual vertexes are used to develop a more global representation of the forces which provides for movement over time of the

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object using mechanical parameters including stresses in or on and deformability of materials, including soft tissues, in a simulated environment for surgery. See Figures 1, 2, 5, 6, 7-18 (WO99/26119 for example) and, page 4, lines 12-31, page 5, lines 1-8; page 6, line 9-page 7, line 37; page 9, lines 31-page 10, line 22; page 11, lines 1-8; page 14, lines 15-18; page 21, line 21-page 22, line 22; page 25, line 32-page 26, line 31; and ANNEX with Lamé coefficients λ and μ , and E, with elasticity and stresses of FR 2,771,202 (French language version citations)

Claim Rejections - 35 U.S.C. § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

21. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cotin et al. (WO99/26119) in view of either Picinbono, Lombardo, Delingette and Ayache (2000, entitled "Anisotropic Elasticity and Force Extrapolation to Improve

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Realism of Surgery Simulation", hereinafter referred to as Picinbono) or Delingette, Cotin and Ayache (2000, entitled "A Hybrid Elastic Model allowing Real-Time Cutting, Deformation and Force-Feedback for Surgery Training and Simulation", hereinafter referred to as Delingette).

22. Contin et al. expressly teaches the limitations of claims 1-5 and 8-14, however does not expressly teach the use of Green-St Venant strain tensor E , as recited in claim 6, with Lamé coefficients as recited in claim 7. However, Picinbono and Delingette, individually expressly teach the use of Lamé coefficients and Green-St Venant strain tensor E , as equations 1, 2 and 3; and as equations 1 and 2, respectively. One of ordinary skill in the art would have knowingly modified Cotin et al. with the teachings of either Picinbono or Delingette, since Cotin expressly states that any other types of elastic deformation laws may be used including and in particular laws of non-linear types for the processing model as taught therein, for example at page 44, lines 21-26.

Moreover, since both Picinbono and Delingette expressly teach using of Lamé coefficients and Green-St Venant strain tensor E for elasticity in the same environment, surgical simulation and force-feedback modeling (Abstracts, entire documents), for simulating behavior of deformable objects as taught in Cotin et al. would have knowingly integrated the best modeling methodology into a system that already performs the same operations for simulating soft tissue in surgical simulation, as also taught in Cotin et al. Cotin et al., also expressly uses Lamé coefficients as taught in both Picinbono and Delingette in the same environment. Integration of the features of either Picinbono or Delingette with Cotin et al., would have been well within the skills of one of ordinary

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skilled in the art at the time the invention was made, to provide an improvement to modeling of the elastic models in surgical simulations as taught in all three references, and as claimed in the Applicant's claims 6 and 7.

Conclusion

23. The prior art made of record, on the accompanying PTO 892, and not relied upon is considered pertinent to applicant's disclosure.

CONTACT INFORMATION

24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to William D. Thomson whose telephone number is 571-272-3718. The examiner can normally be reached on 8:30-3:30 Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached on 571-272-3749. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



William Thomson

Primary Examiner
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Art Unit 2123